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EXAMINER
BORGEEST, CHRISTINA M

ART UNIT	PAPER NUMBER
1649	

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/664,605	GOLEMBO ET AL.	
	Examiner	Art Unit	
	Christina Borgeest	1649	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31,34-42,45-59 and 67-96* is/are pending in the application.

4a) Of the above claim(s) *34,35,45-59 and 67-96* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31 and 36-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *28 June 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Formal Matters

The amendment filed 1 June 2006 is acknowledged. Claims 32, 33, 43 and 44 are cancelled. Claims 31, 40 and 42 are amended. Claims 31, 36-42 are pending and under examination.

Objections/Rejections Withdrawn

Oath/Declaration

The objection to the declaration as set forth at p. 2 of the previous Office action mailed 27 February 2006 is withdrawn in response to Applicants' submission of a corrected declaration.

Priority

The requirement for obtaining benefit of the 00142118 application as required by 35 U.S.C 119(b) has been met in response to Applicants' filing of a copy of the application.

Sequence Rules

The specification is now in compliance with the sequence rules in response to Applicants' correction of p. 24 of the specification.

Specification

The objection to the disclosure as set forth at p. 3 of the previous Office action mailed 27 February 2006 is withdrawn in response to Applicants' explanation (p. 10, 4th paragraph of their response). Specifically, the objection is withdrawn because Applicants' have clarified where the details of Figure 4 could be found.

Drawings

The objection to the drawings as set forth at p. 3 and p. 4 of the previous Office action mailed 27 February 2006 is withdrawn in response to Applicants' submission of replacement drawing sheets.

Claim Objections

The objection to claims 43-44 as set forth at p. 4 and p. 5 of the previous Office action is withdrawn in response to Applicants cancellation of those claims.

Claim Rejections - 35 USC § 112

The rejection of claims 32, 43 and 44 under 35 U.S.C. 112, first paragraph for scope of enablement as set forth at pps. 6-9 of the prior office action (mailed 27 February 2007) has been withdrawn in response to Applicants' cancellation of those claims in the amendment filed 1 June 2006.

In addition, the rejection of claims 39 under 35 U.S.C. 112, first paragraph for lack of enablement as set forth at pps. 7 of the prior office action (mailed 27 February 2007) ***is withdrawn in part*** in response to Applicants' amendment of the claim to include the further limitation of an inhibitor of fibroblast growth factor receptor 3", filed 1 June 2006.

Claim Rejections - 35 USC § 102

The rejection of claims 32 and 43-44 under U.S.C. 102(b) as being anticipated by Tanaka et al. as set forth at p. 9 of the prior office action (mailed 27 February 2006) has been withdrawn in response to Applicants' amendment, filed 1 June 2006, canceling those claims.

The rejection of claims 32-33 under U.S.C. 102(b) as being anticipated by Suzuki et al. as set forth at p. 9 and 10 of the prior office action (mailed 27 February 2006) has been withdrawn in response to Applicants' amendment, filed 1 June 2006, canceling those claims.

The rejection of claims 40 and 42 under 35 U.S.C. 102(b) as set forth at p. 10 of the prior Office action (mailed 27 February 2006) as being anticipated by Yabuta (cited in previous Office action) has been withdrawn in response to Applicants' amendment of claim 40 to recite "wherein the carrier protein is a bone growth plate-specific protein", filed 1 June 2006.

Claim Rejections Maintained

Claim Rejections - 35 USC § 112, first paragraph

The rejection of claims 31, 36-42 under 35 U.S.C. 112 for scope of enablement as set forth at pps. 5-9 of the prior office action (mailed 27 February 2006) is maintained for reasons of record and the following.

Applicants state at p. 11, 1st and 3rd paragraphs that the amended claim 31 incorporates the limitations that are met by the enablement requirement and that each of dependent claims 36-38 and 42 includes the additional limitation that defines the claimed composition.

Applicants state at p. 11, 2nd paragraph, that the newly amended claim 40 now recites a carrier protein that is a bone growth plate specific protein.

Applicants arguments have been fully considered but are not persuasive for the following reasons. Applicants did not fully incorporate the limitations of the now cancelled claim 33 into independent claim 31. Independent claim 31 now reads "[a] pharmaceutical composition...comprising at least one natriuretic peptide ***variant, the peptide*** being set forth...", which is actually broader than cancelled claim 33, because while the peptide is limited to a particular structure (SEQ ID NO: 5), the claim encompasses ***any*** natriuretic peptide ***variant***. In order to truly incorporate the structural limitations of SEQ ID NO: 5, the claim would have to read, "[a] pharmaceutical composition...comprising at least one natriuretic peptide ***variant, the variant*** being set

forth...", Furthermore the newly amended claim 40 does not do limit the composition of the variant to SEQ ID NO: 5, thus all the problems of breadth discussed in the prior office action still apply to the newly amended claims and the rejection under scope of enablement is maintained.

In addition, claim 40 is newly rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a natriuretic peptide-carrier protein fusion protein wherein the carrier protein is growth hormone, does not reasonably provide enablement for natriuretic peptide-carrier protein fusion protein wherein the carrier protein is a "bone growth plate-specific protein." The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue." (See In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 Fed. Cir. 1988) These factors include, but are not limited to: (a) the breadth of the claims; (b) the nature of the invention; (c) the state of the prior art; (d) the level of one of ordinary skill; (e) the level of predictability in the art; (f) the amount of direction provided by the inventor; (g) the existence of working examples; and (h) the quantity of experimentation needed to make or use the invention based on the content of the disclosure.

Claim 40, which has been amended to recite a protein forming a natriuretic peptide-carrier protein fusion protein, wherein the carrier protein a "bone growth plate-

specific protein," is extremely broad because a "bone growth plate specific protein" encompasses much more than simply growth hormone. For instance, Hendy et al. (Kidney Int. 2006; 69: 218-223) teach that the vitamin D receptor is important for the pathophysiology of adynamic bone disorder (see abstract), thus this suggests that this receptor may be a bone growth plate-specific protein. While Applicants are enabled for the carrier protein that is growth hormone, they are not enabled for the entire genus of proteins encompassed by that phrase. In addition, Applicants have given no guidance as to what proteins constitute bone growth plate-specific proteins, and there is no closed definition of that phrase within the specification.

Due to the large quantity of experimentation necessary to test all possible variants of the natriuretic peptides as claimed and to determine which bone growth plate-specific proteins could be conjugated to the natriuretic peptide to form a conjugate as well as determine which proteins are encompassed by the phrase, "bone growth plate-specific", the lack of direction/guidance presented in the specification and the absence of working examples directed to the same and the unpredictability of the effects of mutation on protein structure and function in the context of making variants (see discussion in prior Office action mailed 27 February 2006), and the breadth of the claims which fail to recite limitations on the structure of the natriuretic peptide ***variants*** and the type of bone growth plate specific proteins (and what proteins are encompassed by that term) that could be conjugated to the natriuretic peptides, undue

experimentation would be required of the skilled artisan to make and/or use the claimed invention in its full scope.

Claim 40 is also rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. ***This is a new matter rejection***. There is no ipsis verbis support for the term "bone growth plate-specific protein."

Claim Rejections - 35 USC § 102

The rejection of claim 31 under 35 U.S.C. 102(b) as being anticipated by Tanaka et al. (cited in previous Office action) as set forth at p. 9 of the prior office action (mailed 27 February 2006) is maintained for reasons of record and the following.

Applicants argue at p. 12, 1st paragraph that the amended claim 31 now specifically excludes SEQ ID NO: 2.

Applicants arguments have been fully considered but are not persuasive for the following reasons. As stated above under Rejections under 112, first paragraph, Applicants did not fully incorporate the limitations of the now cancelled claim 33 into independent claim 31, because while the ***peptide*** is limited to a particular structure (SEQ ID NO: 5), the claim still encompasses ***any*** natriuretic peptide ***variant***, including SEQ ID NO: 2. Thus the rejection of claim 31 under 35 U.S.C. 102(b) as set forth at p.

9 of the prior office action (mailed 27 February 2006) as being anticipated by Tanaka et al. (cited in previous Office action) is maintained.

The rejection of claim 31 under 35 U.S.C. 102(b) as being anticipated by Suzuki et al. (cited in previous Office action) as set forth at p. 9 and p. 10 of the prior office action (mailed 27 February 2006) is maintained for reasons of record and the following.

Applicants argue at p. 12, 2nd paragraph, that Suzuki relates a high molecular weight variant of CNP isolated from cardiac atria of the European dogfish and that the isolated peptide consists of 115 amino acids and that Suzuki does not disclose a pharmaceutical composition for bone elongation or for treating skeletal dysplasias comprising at least one natriuretic peptide variant as recited in the present claims.

Applicants further argue that the mature peptide is excluded from the scope of SEQ ID NO: 5 recited in the claims.

Applicants' arguments have been fully considered but are not persuasive for reasons of record and the following. First, the variant of CNP isolated by Suzuki et al. is not outside of the scope of the claim 31. As stated above, claim 31 encompasses a large number of variants of SEQ ID NO: 5. Second, an analysis of the amino acid sequence proposed by Suzuki (see Figures 3 and 4) show that they contain the same amino acid residues as recited in claim 31 (SEQ ID NO: 5). Finally, although the language "pharmaceutical composition" does limit the structure to a compound that is not inconsistent with a pharmaceutical administration, the phrase, "for bone elongation or for treating skeletal dysplasias" is not given patentable weight because it does not

actually limit the claim, which is drawn to a ***product***, not a ***method*** of administration. While Suzuki et al. do not specifically teach administration of the peptide for pharmaceutical purposes, isolation of the peptide as they describe in their Materials and Methods (p. 321-323) is not inconsistent with isolation and purification of peptides for pharmaceutical use. Thus the claim is still encompassed by Suzuki et al.

The rejection of claims 31 and 36-38 under 35 U.S.C. 102(b) as being anticipated by Ohbayashi et al. (cited in previous Office action) as set forth at p. 10 of the prior office action (mailed 27 February 2006) is maintained for reasons of record and the following.

Applicants argue at p. 12, 3rd paragraph that amended claim 31 excludes CNP.

Applicants' argument has been fully considered but is not found persuasive for the following reasons. As discussed above, claim 31 encompasses variants of CNP. Second, because Ohbayashi teach co-administration of thiomorphan with administration of CNP, they still anticipate claims 31 and 36-38.

Finally, the rejection of claim 31 under 35 U.S.C. 102(b) as being anticipated by Yabuta (cited in previous Office action) as set forth at p. 10 of the prior office action (mailed 27 February 2006) is maintained for reasons of record and the following.

With respect to claim 31, Applicants argue at p. 12, 1st paragraph that Yabuta does not disclose or suggest a pharmaceutical composition as recited in amended claim 31, which specifically excludes CNP.

Applicants' argument has been fully considered but are not found persuasive for the following reasons. As discussed above, claim 31 encompasses variants of CNP, thus the composition taught by Yabuta encompasses the claim. Furthermore, the process of producing and isolating fusion proteins as taught by Yabuta is not inconsistent with producing peptides for pharmaceutical use.

Claim Rejections - 35 USC § 103

The rejection of claims 31, 40 and 41 under 35 U.S.C. 103(a) as being obviated by Yabuta as applied to claim 31 above, and further in view of Rivera et al. and Mericq et al. (all references cited in previous Office action) as set forth at p. 11 and p. 12 of the prior office action (mailed 27 February 2006) is maintained for reasons of record and the following. ***In addition, newly amended claim 42, which now depends directly from claim 40 (and no longer from claim 31), and incorporates the limitations of claim 40*** is also included in this rejection under 35 U.S.C. 103(a) as necessitated by the amendment of this claim.

With regard to the Yabuta alone, Applicants argue at p. 12, last paragraph to p. 13, 1st paragraph that Yabuta teaches away from claimed composition because Yabuta requires the peptide bond be cleaved between the C-terminal of the linker amino acid residue and the N-terminal of the target peptide.

Applicants further argue that in contrast to Yabuta, the natriuretic peptide-carrier fusion protein according to the claims is intended to remain a single entity in order to effect targeting of the natriuretic peptide to the growth plate of the bone. Applicants

further state that claim 40 is amended to recite that the carrier protein is a bone growth plate specific protein.

With regard to the combined teachings of Yabuta, Rivera et al. and Mericq et al., Applicants argue at p. 13, last paragraph to p. 14 that Yabuta does not disclose or suggest the compositions recited in claims 31 40 and 41.

Applicants argue that Rivera et al. teaches cleaving the peptide bond to release a therapeutic protein but does not disclose or suggest a composition comprising a natriuretic peptide wherein the carrier protein functions specifically at the growth plate.

Applicants argue that Mericq et al. relates to effects of growth hormone (GH) therapies and does not disclose or suggest the recited compositions.

Applicants argue that none of the references alone or in combination disclose a pharmaceutical composition as recited in claims 31, 40 or 41.

Applicants arguments have been fully considered but are not found persuasive for the following reasons. First, for clarity, claims 31, 40, 41 and 42 are drawn to a pharmaceutical composition comprising at least one natriuretic peptide variant, the peptide being set forth in SEQ ID NO: 5 (with the possible substitutions recited in claim 31) and a carrier or excipient, wherein the pharmaceutical composition comprises a natriuretic peptide fused to a carrier protein forming a natriuretic peptide-carrier protein fusion protein, wherein said natriuretic peptide is conjugated to a carrier protein forming a natriuretic peptide carrier protein conjugate and wherein the carrier protein is growth hormone.

Second, the rejection was made on the following grounds. As state above, Yabuta teach a fusion protein consisting of a CNP variant (the target peptide) fused to a carrier protein, and the CNP taught by Yabuta encompasses the variants of claim 31. Yabuta does not teach that the CNP variant is attached to growth hormone (GH). Rivera et al. teach that GH can be fused to another human protein (see. p. 827, Figure 1) to promote storage in the endoplasmic reticulum (ER). Although the reason for combining the references is not the same as Applicants, a CNP fused to a modified GH carrier peptide described by Rivera would have advantages, namely, the authors demonstrate that the fusion protein can be stored in the ER thus potentially enabling controlled release of therapeutic proteins (see p. 829, right column, 1st paragraph) and presumably eliminating the need for frequent injections in protein therapy. There was a need in the art for this because it was generally accepted that protein administration requires frequent and uncomfortable injections. Furthermore, as evidenced by Mericq et al., GH is recognized in the art as therapy for bone elongation, thus functions specifically at the growth plate. Furthermore, the practitioner of ordinary skill in the art could reasonably have expected success because Yabuta describe the successful manufacture of the fusion protein (see p. 13-14, Examples 7-8) and claim that their invention avoids the rapid degradation which occurs when proteins are produced recombinantly (p. 2, lines 3-13) and the advantages of conjugating the target protein to a carrier protein as described in Rivera et al. to prolong half life (see above). Thus the claims do not contribute anything non-obvious over the prior art.

Third, in response to Applicants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Fourth, in response to Applicants' argument that the combined references do not suggest the claimed inventions, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). For instance, in response to Applicants' arguments that Yabuta and Rivera et al. teach compositions wherein the carrier protein is eventually cleaved from the target peptide, thus do not teach the conjugated protein as recited in the claims, the web definition for "conjugated protein" is a protein complex combining amino acids with other substances, and that definition encompasses fusion proteins. Furthermore, at paragraph 28 of the specification Applicants' state: "alternatively, the NP [natriuretic peptide] may be conjugated to an agent to prolong its half life in circulation or to a peptide that facilitates translocation across a cell membrane." Rivera et al. teach a protein conjugated to GH to increase the biological half-life of the protein by promoting storage in the endoplasmic reticulum and decreasing the need for multiple injections of the target peptide. Although the fusion protein taught by Rivera et al. does eventually get cleaved from the target

peptide, the composition they teach is a fusion protein and is not inconsistent with a conjugated protein as defined in the art or in the specification.

Fifth, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the natriuretic peptide-carrier fusion protein according to the claims is intended to remain ***a single entity in order to effect targeting of the natriuretic peptide to the growth plate of the bone***) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification or Applicants' arguments are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Again, a fusion protein is not inconsistent with a conjugated protein, as it is defined in the art or in the specification. Although Applicants' have amended claim 40 to recite that the carrier protein is a bone growth plate specific protein, Rivera et al. teach fusion proteins that are fused to GH, and Mericq et al. provide evidence that GH is a bone growth plate specific protein. Finally, in response to Applicants argument that Applicants argue that Mericq et al. merely relates to effects of growth hormone (GH) therapies and does not disclose or suggest the recited compositions, the Examiner does not take issue with this comment because Mericq et al. show evidence that GH is a bone growth plate-specific protein.

With regard to Applicants' statement that withdrawn claims 45-59 and 67-96 depend directly or indirectly form claim 31, that these claims should be re-joined and

allowed when claim 31 is allowed, this argument is moot, since claim 31 remains rejected.

Conclusion

No claim is allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Borgeest whose telephone number is 571-272-4482. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet Andres can be reached on 571-272-0867. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Christina Borgeest, Ph.D.

JANET L. ANDRES
SUPERVISORY PATENT EXAMINER